S32 CHILDHOOD WHEEZE PHENOTYPES CAN BE USEFULLY SUB-CLASSIFIED USING LONGITUDINAL LUNG FUNCTION AND ATOPIC SENSITISATION DATA. EVIDENCE FROM THE SOUTHAMPTON WOMEN'S SURVEY

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Background Epidemiological phenotypes for childhood wheeze were first proposed by the Tucson Children's Respiratory Study (TCRS), describing four distinct phenotypes. A new, six phenotype, characterisation has recently been proposed by the Avon Longitudinal Study of Parents And Children (ALSPAC). No previous cohort has included 1 year atopic sensitisation data with infant lung function in their analysis.

Objectives To classify infant and 6 year lung function and allergic sensitisation data at 1, 3 and 6 years from the Southampton Women's Survey (SWS) cohort according to the ALSPAC 6 class pheno type model. To contrast this with TCRS phenotypes to assess clinical and epidemiological utility.

Methods At 6 years, 926 children had assessment of respiratory symptoms. Spirometry was measured in 791 children, with exhaled nitric oxide (n=589) and methacholine challenge (n=234). At 5–14 weeks of age 95 of these children had lung function measured. Symptom data on wheeze status obtained at 6m, 12m, 2y, 3y and 6y follow up classified children into groups proposed from analyses of ALSPAC (never, early, transient, intermediate-onset, late-onset and persistent wheeze).

Results Persistent and intermediate-onset wheeze were significantly associated with atopy at 1, 3 and 6 years, and exhaled nitric oxide at 6 years. Late-onset wheeze was not associated with atopic sensitisation until 3 years. Persistent wheezers had lower infant(V'maxFRC $p<0.05$) and 6 year lung function (FEV_1, FEV_1/FVC and $FEF_{25–75}$, $p<0.05$), whilst late- and intermediate-onset-wheezers showed no lung function deficits. Transient wheezers were non-atopic but showed persistent lung function deficits ($FEF_{25–75}$, $p<0.05$ and V'maxFRC, $p<0.001$), except for those who wheezed only in the first year of life (early phenotype).

Conclusion The SWS cohort data maps well into the ALSPAC phenotype classification, demonstrating useful subdivision of TCRS wheeze phenotypes. Lung function and atopy successfully differentiate persistent, late-onset and intermediate-onset wheeze, whilst the classical 'transient early' wheeze phenotype can be sub-classified into groups that reflect early lung function. This has potential significance for research into childhood wheeze and long term respiratory morbidity of children in these phenotypes.

S33 VALIDATION OF THE GLI-2012 MULTI-ETHNIC SPIROMETRY REFERENCE EQUATIONS IN LONDON SCHOOL CHILDREN

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The Global Lung Function Initiative (GLI) recently published the first global all-age (3–95 years) multi-ethnic reference equations for spirometry (Quanjer 2012 ERJ).

Aim To assess the agreement of the GLI reference range to contemporary lung function data from children living in Britain to verify its appropriateness for clinical use in this population.

Methods Anthropometry and spirometry were undertaken within a mobile laboratory in primary school children recruited to the Size and Lung function In Children study during one school year (2011–2012). Spirometry Z-scores were calculated using the GLI-2012 reference range, using the 'Black equation' for South Asian children, for whom a specific equation has yet to be developed.

Results Spirometry data from 728 (47% boys; 35% White; 28% Black; 26% South Asian; 11% other/mixed race) healthy children aged 5–11 years from eight London schools were eligible for inclusion. Mean (SD) age of 8 (1.6) years was similar across the 4 ethnic groups. After adjustment for age and sex, Black children were significantly heavier and taller compared to other groups, while South Asians were significantly lighter. When compared with White children, after adjusting for age, sex and standing height, FEV_1 was significantly lower by a mean(95%CI) of 14% (11%; 16%) in Black; 11% (9%; 14%) in South Asian and 4% (1%; 8%) in the "other"/mixed race children. Similar patterns were seen for FVC but FEV_1/FVC was similar across all groups. When expressed according to ethnic-specific reference equations the mean (SD) for FVC, FEV_1 and FEV_1/FVC for the White, Black and other groups approximated 0(1) suggesting that the GLI equations are appropriate for use in this population (Figure). Mean (95%CI) FVC and FEV_1 were however 3% (–0.1%; 6.1%, $p=0.07$) higher in South Asian than Black children.

Conclusions This study shows that the GLI-2012 equations are appropriate for use in children across a wide range of ethnicities. Of the currently available equations, the 'Black equation' provides the best fit for South Asian children, although it results in slight overestimation of lung function, emphasising the need to develop specific coefficients for this group.

S34 LUNG FUNCTION IN CHILDREN WITH SICKLE CELL DISEASE

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Introduction Sickle Cell Disease (SCD) is one of the most prevalent genetic diseases with an incidence of ~1 in 200 Afro-Caribbean children in the UK (WHO; 2006). Since SCD can result in significant respiratory morbidity,[1] lung function tests (LFTs) could play an important role in the clinical management of children with SCD.

Aim To determine the extent to which LFTs identify differences in children with SCD when compared with healthy Black children.

Methods A respiratory health questionnaire was administered, and four commercially available LFTs (Impulse oscillometry (IOS), specific effective airways resistance (sR_{eff}), plethysmographic lung volumes, and spirometry) were undertaken in up to 214 healthy Black children and 85 children with SCD aged 4–12y.

Results Amongst children with SCD, 50% reported cough on most days, and 25% had been reviewed by a specialist respiratory consultant within 3 months prior to the assessments. When compared with healthy children, 20% had a reduced total lung capacity (TLC), with concurrent reductions in FEV_1 and FVC No differences in sR_{eff} were observed and IOS outcomes proved to be of limited value, due to poorly defined limits of normality and large between-subject variability. No significant group differences in bronchodilator responsiveness in SCD or healthy children were observed regardless of the outcome measured (Table 1).

Conclusion Despite the high proportion of respiratory symptoms reported, the number of children with LFTs falling outside the limits of normal was relatively small. Results suggest a pattern of restrictive lung disease in children with SCD. Of the outcomes assessed, baseline spirometry appears to be the most useful for routine assessment of lung disease in young children with SCD.

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